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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,493	01/06/2005	Hui Wang	495152002100	9845
7590 Hui "David" Wang, President ACM RESEARCH, INC. 4378 Enterprise Street Fremont, CA 94538			EXAMINER SMITH, BRADLEY	
			ART UNIT 2891	PAPER NUMBER
			MAIL DATE 06/04/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/520,493

**Applicant(s)**

WANG ET AL.

**Examiner**

Bradley K. Smith

**Art Unit**

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 and 29-39 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 29-39 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 1/6/05 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input checked="" type="checkbox"/> Other: <u>search notes</u> |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 13 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Paragraph 0036 in the specification discloses metal pattern density but does not disclose the detection of the metal density. This claim will not be addressed with respect to the prior art.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 4-10 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Uzoh et al. (US Patent 6,234,870). Uzoh et al. disclose electropolishing a portion of the metal layer, wherein portions of the metal layer are electropolished separately; before electropolishing the portion, measuring the thickness; and adjusting an amount that the portion is to be electropolished based on the thickness measurement (see columns 6 line 11-column 8 line 50). With regards to claim 2, Uzoh et al. discloses applying electrolyte (column 8 lines 18-26). With regards to claim 4, Uzoh et al. disclose the translation of the nozzle (see figure 6a and column 7 lines 30-35). With regards to claim 5, Uzoh et al. disclose the voltage may be adjusted (column 8 lines 24-25). With regards to claim 6, Uzoh et al. inherently disclose altering the duration of the polishing because the reference teaches altering the characteristics of the polishing process to form a dynamic polishing process (see column 4 lines 52-60) and polish at different rates (column 4 lines 40-42). With regards to claim 7, Uzoh et al. disclose obtaining a map of the thickness measurement (see column 5 lines 10-17). With regards to claim 8, Uzoh et al. disclose measuring thickness measurements of the metal layer using an end-point detector; and wherein adjusting an amount that the portion is to be electropolished comprises: adjusting the amount that the portion is to be electropolished during an initial polishing using the map of the thickness measurement of the metal layer determined using the thickness metrology tool; and adjusting the amount that the portion is to be electropolished during a subsequent polishing using the thickness measurement measured (see column 5 lines 5-30). With regards to claim 9,

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Uzoh et al. disclose measuring and profiling/mapping. Further more the examiner would like to point out in making a map there must be some interpolation not every point on the surface could be measured, so the interpolation is inherently disclosed by Uzoh et al. With regards to claim 10, Uzoh disclose an endpoint detector (225) adjacent the metal layer (see figure 6b). With regards to claim 15, Uzoh et al. disclose the detector is an eddy current detector (column 6 lines 18-20).

Claims 1-6, 10, 11, 14, and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Wang et al. (US 2004/0238481). Wang et al. disclose electropolishing a portion of the metal layer, wherein portions of the metal layer are electropolished separately; before electropolishing the portion, measuring the thickness; and adjusting an amount that the portion is to be electropolished based on the thickness measurement (figure 14c). With regards to claim 2, Wang et al. discloses applying electrolyte [0038]. With regards to claim 3, Wang et al. discloses moving the substrate with respect to the stationary nozzles [0049]. With regards to claim 4, Wang et al. disclose the translation of the nozzle [0049]. With regards to claim 5, Wang et al. disclose the current may be adjusted [0035]. With regards to claim 6, Wang et al. disclose adjusting the polishing duration in figure 14c, using different ratios of polishing rates will lead one to durations of the polishing time. With regards to claim 10, Wang et al. disclose an endpoint detector (1010) adjacent the metal layer and is stationary [0048-0049]. With regards to claims 14 and 15, Wang et al. disclose the detector is an optical sensor or an eddy current detector [0048].

Claim 29 is rejected under 35 U.S.C. 102(e) as being anticipated by Campbell (US 6,454,899). Campbell disclose polishing the metal layer to remove the metal layer covering the non-recessed area; and polishing the metal layer in the recessed area to a height below the non-recessed area, wherein the height is equal to or greater than a thickness of the barrier layer (230) (see figures 1 and 4).

Claims 29-39 are rejected under 35 U.S.C. 102(e) as being anticipated by Wang (US Patent 6,447,668). Wang discloses polishing the metal layer to remove the metal layer covering the non-recessed area; and polishing the metal layer in the recessed area to a height below the non-recessed area, wherein the height is equal to or greater than a thickness of the barrier layer (see figures 1 and 2). With regards to claims 30-33, Wang discloses using an electropolishing with an electrolytic stream and the translation of the wafer and the nozzle. With regards to claims 34-39 Wang discloses using plasma etching and all of the different layers.

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 10-12, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lehman et al. (US 2003/0181131) in view of Uzoh et al. (US Patent 6,234,870). Lehman disclose electropolishing a portion of the metal layer, wherein portions of the metal layer are electropolished separately; adjusting an amount that the portion is to be electropolished based on the thickness measurement [0038-0060]. With regards to claims 10-11, 14, and 15 Lehman discloses the detector adjacent to the metal layer (figure 1), the detector being stationary against the metal layer (figure 1 and [0082-0086]), and detecting using a eddy current sensor or a optical sensor. With regards to claim 12, Lehman et al. disclose the thickness measurements are mapped using a plurality of pixel partitions (see figures 12 and 13). Lehman fails to disclose before electropolishing the portion, measuring the thickness of the metal to be electropolished. However, Uzoh et al disclose before electropolishing the portion, measuring the thickness of the metal to be electropolished. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Uzoh et al. and Lehman, because inspecting/mapping the

metal before polishing will help increase throughput and increase yield (Uzoh et al. column 4 lines 17-32).

Claims 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Campbell (US 6,454,899) in view of Uzoh et al. Campbell disclose polishing the metal layer to remove the metal layer covering the non-recessed area; and polishing the metal layer in the recessed area to a height below the non-recessed area, wherein the height is equal to or greater than a thickness of the barrier layer (230) (see figures 1 and 4). But Campbell fails to disclose the use of electropolishing with electrolytes. Whereas Uzoh et al. disclose the use of electropolishing and electrolytes Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Uzoh et al. and Campbell et al. because the electropolishing would help remove the metal and increase throughput (Uzoh et al. column 4 lines 17-32).

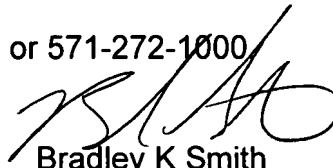
### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bradley K. Smith whose telephone number is 571-272-1884. The examiner can normally be reached on 10-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Bradley K Smith  
Primary Examiner  
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